



## Continued Caution Urged for Pilot Use of Alcohol

*Medical studies suggest that moderate alcohol consumption offers health benefits in limited areas. But news accounts of the studies tend to focus on the “good news,” while ignoring or de-emphasizing negative consequences.*

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In December 1997, the news media reported on a study in a widely known medical journal that suggested — news accounts implied — that drinking alcohol is good for health. The media said that an alcoholic drink a day reduced middle-age deaths as much as 20 percent.

But anyone who believes that medical science has discovered that drinking alcohol is a good way to prolong life or avoid illness is misinformed. A discussion of the study's details will make clear why simplistic interpretations must not go unchallenged.

The study report, by Michael J. Thun and colleagues, was published in the *New England Journal of Medicine*.<sup>1</sup> The study undertaken by Dr. Thun and his colleagues may be “the biggest ... ever” in terms of its subject population: 490,000 men and women, between ages 30 and 104 (with a median age of 56) who reported their alcohol and tobacco use in 1982 to American Cancer Society volunteer interviewers as part of the Cancer Prevention Study II.

The subjects who had reported drinking alcohol within the previous 10 years were assigned to various baseline categories based on their rate of consumption. Those who reported drinking any alcoholic beverage less than daily but at least three times per week were categorized as “less than daily” drinkers. Those who reported an intake of at least one drink a day received classifications ranging from “one daily” to “greater [than]/equal [to] six daily.”



By 1991, 12 percent of the study population were known to have died. The investigators collected data on the causes of death in the study population. These causes of death were charted, and the reported alcohol intake was related to the “cumulative probability of dying between the ages of 35 and 69 years.”

To prevent the results from being skewed by other health-risk factors, the results were controlled for age, race, education, body-mass index, smoking, a “crude index” of fat consumption, and the use or nonuse of estrogen-replacement therapy in women. Particular causes of mortality were also controlled for certain factors — for example, statistics about

mortality from breast cancer were adjusted for family history of the disease.

The analysis did show some apparent good news about drinking alcohol.

“The rates of death from all cardiovascular diseases were 30 [percent] to 40 percent lower among men and women reporting at least one drink daily than among nondrinkers, with little relation to the level of consumption,” said the report. “The overall death rates were lowest among men and women reporting about one drink daily.”

Before turning to the negative implications of the same study, and the methodological complexities of such research, it will be useful to consider a second study that purports to show a beneficial link between alcohol consumption and health.

## Alcohol's Effects Can Linger Beyond the "Bottle-to-throttle" Period

Under U.S. Federal Aviation Regulations (FARs) Part 91.17, piloting an airplane is prohibited within eight hours after the consumption of any alcoholic beverage or if the pilot's blood-alcohol level is 0.04 percent or more.

One highly publicized instance of a FARs Part 91.17 violation occurred in 1990 when three Boeing 727 flight crewmembers of a major U.S. carrier had their pilot licenses revoked, and they were dismissed from their jobs after they began a flight less than seven hours after the crew was seen drinking in a bar. The airline for which they flew had a more strict rule than that in the FARs, requiring that its pilots refrain from drinking alcohol for 12 hours before flying.

After completing their flight without incident, the pilots were taken into custody at the destination airport. All were found to have blood-alcohol levels in excess of 0.04 percent; the captain's level was 0.13 percent, a level that would have sufficed for conviction of drunken driving anywhere in the United States. Tried under U.S. federal law, the pilots were found guilty and sentenced to jail terms of 16 months for the captain and one year for the first officer and the flight engineer.

But some researchers argue that the eight-hour "bottle-to-throttle" rule and the 0.04 percent blood-alcohol level are not stringent enough, because alcohol intake continues to decrease piloting skills after the effects — including "morning-after" or "hangover" effects — have subsided. One experiment appears to confirm that assertion, suggesting that residual effects continue even when no alcohol remains in the bloodstream.<sup>3♦</sup>

Writing in the *Journal of the American Geriatrics Society*, Thomas O. Obisesan and colleagues reported on a study of alcohol use vs. the probability of developing age-related macular degeneration (AMD).<sup>2</sup>

AMD is an eye disease characterized by degeneration of the macula, the depression in the central part of the retina of the eye. The disease is the leading cause of blindness in adults over 65, and causes blurred or distorted central vision for many patients who have milder forms of AMD.

Obisesan and colleagues studied a population sample of 3,072 adults, of whom 184 were diagnosed with AMD, who had answered a questionnaire about their alcohol use. A statistically significant negative association was found between AMD and wine consumption (either drinking wine only or drinking wine as well as other types of alcoholic beverages), after controlling for age, gender, income, history of congestive heart failure and hypertension. (Although the causes of AMD are not understood, the latter two factors were included because cardiovascular diseases are suspected of being involved.)

"Moderate wine consumption is associated with decreased odds of developing AMD," said the report.

So these two reports imply that alcohol is beneficial in one way or another. And there will no doubt continue to be newspaper articles from time to time with provocatively positive interpretations of other studies about alcohol and health. But there are reasons to approach such conclusions with caution. The questionable aspects of "alcohol health benefit" studies fall into two broad categories: selectivity and methodology.

**Selectivity can misrepresent results.** Medical studies are usually very scrupulous about fully disclosing both the benefits and the harm from alcohol that their findings suggest. For example, the report of the study by Thun and colleagues said, "Alcohol consumption has both adverse and beneficial effects on survival." But articles in the popular press may focus on one side of the story.

"Alcohol consumption was associated with increased rates of death from cirrhosis and alcoholism and from cancers of the mouth, esophagus, pharynx, larynx and liver combined," said the report. "The death rates from these conditions were three [times] to seven times as high among both men and women who reported at least four drinks daily as among nondrinkers."

An increase in breast cancer in the female population was associated with alcohol consumption.

"Mortality from breast cancer was 30 percent higher among women reporting at least one drink daily than among nondrinkers," said the report.

That finding was supported in a paper by 16 cancer specialists who studied the clinical literature from six studies involving a total of 4,335 women diagnosed with invasive breast cancer.<sup>4</sup> The studies included long-term data about food and alcohol intake.

The paper said, "Alcohol consumption was positively associated with the risk of invasive breast cancer. Women who consumed, on average, 30 [grams per day] to less than 60 grams per day of alcohol (about two [drinks] to five drinks per day) had a relative risk of 1.41," that is, a 41 percent higher risk.

Drinking alcohol in the belief that it will help prevent cardiovascular disease becomes less attractive if, as this study indicates, drinking is associated with a greater risk of some kinds of cancer. Women need to be especially cautious in interpreting the "health benefits" of even "moderate" alcohol consumption.

Quantity of alcohol intake matters.

"The rates of death from all causes were lowest among both men and women who reported one drink daily; the rates were about 20 percent below those of nondrinkers," said the report of the study by Thun and colleagues. "Above one drink per day, the overall death rate among drinkers increased, although the shape of the dose-response relation with alcohol consumption varied substantially in different subgroups of the population. ... [Nevertheless,] in most subgroups, the rates of

death from all causes were lowest among people who reported one drink of alcohol daily.”

That the risk increases (or the purported benefit decreases) at higher rates of alcohol consumption is important because of the body’s increasing tolerance to alcohol with steady use. Eventually, the drinker who regularly consumes one drink a day will probably find it necessary to have two to achieve the same euphoric effect of one drink. With increasing tolerance, the number of drinks may continue to climb to three or four.

Selective reporting of alcohol health benefit often ignores the increased death rates for those who regularly consume three or more drinks per day. And it is easy to fall into the fallacy of believing that if a small amount of something is beneficial, a greater amount will be more beneficial. The study by Thun and colleagues shows that this is not so with alcohol.

Supplementing alcohol with tobacco heightens the adverse effects of each, so that combining the two is a major multiplier of mortality risk. In the study by Thun and colleagues, smoking doubled the risk of death for those between ages 35 to 69. For the middle-aged, the benefits of small amounts of alcohol are much less than the hazards of tobacco use.

**Methodology of some studies is questionable.** No matter how carefully a study is designed, there are likely to be at least some factors that make the conclusions less than definite.

The study by Thun and colleagues was based on answers to a mailed questionnaire. It would be naive to believe that the answers overall represented objective truth.

When people are questioned about the amounts of various beverages and foods consumed, as well as their other lifestyle practices, answers with a significant range of error are common. Few people monitor their intake quantitatively or carefully, and memory is unreliable. Even with written questionnaires, some respondents tend (often unconsciously) to give socially acceptable answers, such as underreporting intake of alcohol if they believe it is excessive. Others, perhaps those who take pride in having reduced or eliminated their alcohol intake, might exaggerate the level of their former use so as to magnify their sense of achievement in the reduction or abstention.

The structure of the questionnaire might force the respondent to place himself or herself in an arbitrarily collapsed category concerning type of alcohol consumed, alcohol amount per drink and number of drinks per time unit. Questionnaires that follow a model along the lines of “How many alcoholic drinks did you consume in the past week?” are particularly prone to such errors. Many individuals’ drinking habits vary considerably throughout their lives or even in a given year or month, and data from a limited period cannot simply be extrapolated to represent a respondent’s long-term habits.

Aside from the issues surrounding accuracy of questionnaire-based data, the ease with which numerous data points can be processed quickly by computer adds to the probability that some kind of correlation will appear between two out of a large number of items. But in analyzing data, consider the fundamental principle that association does not prove causation. Many correlations in a variety of studies have

**Table 1**  
**Fatal Accidents<sup>a</sup> of Large<sup>b</sup> U.S. Aircraft Involving Alcohol**

| Year of Accidents | Number of Decedents | Pilots    | Copilots  | Aircraft  | Pilots with Alcohol <sup>c</sup> | Copilots with Alcohol <sup>c</sup> | Total Flight Crewmembers with Alcohol <sup>c</sup> |
|-------------------|---------------------|-----------|-----------|-----------|----------------------------------|------------------------------------|--|
| 1990              | 9                   | 8         | 1         | 8         | 1                                | 0                                  | 1  |
| 1991              | 13                  | 9         | 4         | 9         | 0                                | 2                                  | 2  |
| 1992              | 15                  | 8         | 7         | 8         | 0                                | 0                                  | 0  |
| 1993              | 13                  | 7         | 6         | 7         | 1                                | 0                                  | 1  |
| 1994              | 15                  | 10        | 5         | 10        | 1                                | 1                                  | 2  |
| 1995              | 6                   | 4         | 2         | 4         | 0                                | 0                                  | 0  |
| 1996              | 24                  | 14        | 10        | 14        | 3                                | 1                                  | 4  |
| 1997              | 14                  | 7         | 7         | 7         | 1                                | 2                                  | 3  |
| 1998 <sup>d</sup> | 4                   | 2         | 2         | 2         | 1                                | 1                                  | 2  |
| <b>Totals</b>     | <b>113</b>          | <b>69</b> | <b>44</b> | <b>69</b> | <b>8</b>                         | <b>7</b>                           | <b>15</b>  |

Aircraft involved in alcohol-related accidents:

1990: Lockheed 1049 Super Constellation

1991: Embraer E-120; Gates Learjet

1993: Gates Learjet

1994: McDonnell Douglas AH-64 (Apache); Boeing 737-300

1996: Martin B-26; Boeing 707; McDonnell Douglas F/A-18

1997: McDonnell Douglas DC-8; Douglas DC-3; Boeing 747

1998: Gates Learjet

<sup>a</sup> Data represent only those fatal accidents involving pilot/copilot use of alcohol for which lab work was done at the U.S. Federal Aviation Administration (FAA) Toxicology and Accident Research Laboratory.

<sup>b</sup> More than 12,500 pounds (5,670 kilograms) gross takeoff weight.

<sup>c</sup> Blood alcohol above FAA limit, 0.04 percent.

<sup>d</sup> Through June 3, 1998.

Source: U.S. Federal Aviation Administration, Civil Aeromedical Institute

proven to result from chance rather than a cause-and-effect relationship.

It might be found that those who have won the last several lotteries wore black shoes at the time of buying their tickets. But only the most superstitious would draw the inference that wearing black shoes when buying a ticket improves the odds of winning the lottery. The studies that seem to show that alcohol consumption might lengthen lifespan or prevent degeneration of vision components may be analogous to the example of the lottery and the black shoes.

The alcohol-AMD study by Obisesan and colleagues raises a similar logical question. The predominant negative association between alcohol and AMD was for those subjects who drank wine, either exclusively or in addition to beer, liquor or both.

The authors reported that those in the population who drank wine were shown by mathematics to have decreased odds of developing AMD, even when drinking as little as one drink a month. If the wine was responsible for reducing the incidence of AMD, then there are two possibilities: The risk reduction was caused by the alcohol, or was caused by other components of the wine.

Alcohol is alcohol, whether found in wine, gin, vodka, beer, whiskey or other alcoholic beverages. But the study found that neither beer alone nor liquor alone had the same apparent beneficial effect.

If other components of wine were the agent of AMD risk reduction, then those parts of the grape that constitute the nonalcoholic ingredients of wine are also found in grape juice.

Perhaps the consumption of grape juice would be equally beneficial in preventing AMD.

In sum, although there is some evidence that moderate alcohol use offers a few limited health benefits, there is abundant evidence that alcohol is an addictive drug that can have many short-term and long-term ill effects on the body and mind. Optimum functioning of body and mind are important for everyone, but are essential for all flight-operations personnel. ♦

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